CLAIMS

1. A fluorescent protein derived from Montipora sp., which has the following properties:

[1] the excitation maximum wavelength is 507 nm;

[2] the fluorescence maximum wavelength is 517 nm;

[3] the molar absorption coefficient at 507 nm is 104,050;

[4] the quantum yield is 0.29; and

[5] the pH sensitivity of light absorption property is pKa of approximately 5.5.

2. A fluorescent protein derived from Acropora sp., which has the following properties:

[1] the excitation maximum wavelength is 505 nm;

[2] the fluorescence maximum wavelength is 516 nm;

[3] the molar absorption coefficient at 505 nm is 53,600;

[4] the quantum yield is 0.67; and

[5] the pH sensitivity of light absorption property is pKa of approximately 6.4.

3. A fluorescent protein derived from Acropora sp., which has the following properties:

[1] the excitation maximum wavelength is 472 nm;

[2] the fluorescence maximum wavelength is 496 nm;

[3] the molar absorption coefficient at 472 nm is 27,250;

[4] the quantum yield is 0.90; and

[5] the pH sensitivity of light absorption property is pKa of approximately 6.6.

4. A fluorescent protein derived from Montipora sp., which has the following properties:

[1] the excitation maximum wavelength is 557 nm;

[2] the fluorescence maximum wavelength is 574 nm;

[3] the molar absorption coefficient at 557 nm is 41,750;

[4] the quantum yield is 0.41; and

[5] the pH sensitivity of light absorption property is pKa < approximately 4.0.

5. A chromoprotein derived from Actinia equina, which has the following properties:

[1] the absorption maximum wavelength is 592 nm;

[2] the molar absorption coefficient at 592 nm is 87,000; and

[3] the pH sensitivity of light absorption property is stable in the range between pH 5 and 10.

6. A fluorescent protein derived from Lobophytum crassum, which has the following properties:

[1] the excitation maximum wavelength is 482 nm;

[2] the fluorescence maximum wavelength is 498 nm;

[3] the molar absorption coefficient at 482 nm is 71,000;

[4] the quantum yield is 0.41; and

[5] the pH sensitivity of the fluorescence maximum is stable in the range between pH 4 and 10.

7. A fluorescent protein having either the following amino acid sequence (a) or (b):

(a) an amino acid sequence shown in SEQ ID NO: 1; or

(b) an amino acid sequence, which comprises a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1, and which has a fluorescence.

8. A fluorescent protein having either the following amino acid sequence (a) or (b):

(a) an amino acid sequence shown in SEQ ID NO: 3; or

(b) an amino acid sequence, which comprises a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 3, and which has a fluorescence.

9. A fluorescent protein having either the following amino acid sequence (a) or (b):

(a) an amino acid sequence shown in SEQ ID NO: 5 or 7; or

(b) an amino acid sequence, which comprises a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 5 or 7, and which has a fluorescence.

10. A fluorescent protein having either the following amino acid sequence (a) or (b):

(a) an amino acid sequence shown in SEQ ID NO: 9; or

(b) an amino acid sequence, which comprises a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 9, and which has a fluorescence.

11. A chromoprotein having either the following amino acid sequence (a) or (b):

(a) an amino acid sequence shown in SEQ ID NO: 11; or

(b) an amino acid sequence, which comprises a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 11, and which has light-absorbing properties.

12. A fluorescent protein having either the following amino acid sequence (a) or (b):

(a) an amino acid sequence shown in SEQ ID NO: 13; or

(b) an amino acid sequence, which comprises a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 13, and which has fluorescence.

13. DNA encoding the protein according to any one of claims 1 to 12.

14. DNA of either the following (a) or (b):

(a) DNA encoding an amino acid sequence shown in SEQ ID NO: 1; or

(b) DNA which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1, and which encodes a fluorescent protein.

15. DNA having either the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence shown in SEQ ID NO: 2; or

(b) a nucleotide sequence which comprises a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 2, and which encodes a fluorescent protein.

16. DNA of either the following (a) or (b):

(a) DNA encoding an amino acid sequence shown in SEQ ID NO: 3; or

(b) DNA which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 3, and which encodes a fluorescent protein.

17. DNA having either the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence shown in SEQ ID NO: 4; or

(b) a nucleotide sequence which comprises a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 4, and which encodes a fluorescent protein.

18. DNA of either the following (a) or (b):

(a) DNA encoding an amino acid sequence shown in SEQ ID NO: 5 or 7; or

(b) DNA which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 5 or 7, and which encodes a fluorescent protein.

19. DNA having either the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence shown in SEQ ID NO: 6 or 8; or

(b) a nucleotide sequence which comprises a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 6 or 8, and which encodes a fluorescent protein.

20. DNA of either the following (a) or (b):

(a) DNA encoding an amino acid sequence shown in SEQ ID NO: 9; or

(b) DNA which has an amino acid sequence comprising a deletion, substitution, and/or

addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 9, and which encodes a fluorescent protein.

21. DNA having either the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence shown in SEQ ID NO: 10; or

(b) a nucleotide sequence which comprises a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 10, and which encodes a fluorescent protein.

22. DNA of either the following (a) or (b):

(a) DNA encoding an amino acid sequence shown in SEQ ID NO: 11; or

(b) DNA which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 11, and which encodes a protein having light-absorbing properties.

23. DNA having either the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence shown in SEQ ID NO: 12; or

(b) a nucleotide sequence which comprises a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 12, and which encodes a protein having light-absorbing properties.

24. DNA of either the following (a) or (b):

(a) DNA encoding an amino acid sequence shown in SEQ ID NO: 13; or

(b) DNA which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 13, and which encodes a fluorescent protein.

25. DNA having either the following nucleotide sequence (a) or (b):

(a) a nucleotide sequence shown in SEQ ID NO: 14; or

(b) a nucleotide sequence which comprises a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 14, and which encodes a fluorescent protein.

26. A recombinant vector having the DNA according to any one of claims 13 to 25.

27. A transformant having the DNA according to any one of claims 13 to 25 or the recombinant vector according to claim 26.

28. A fusion fluorescent protein, which consists of the fluorescent protein according to any one of claims 1 to 4, 6, 7 to 10, and 12, and another protein.

29. The fusion fluorescent protein according to claim 28, wherein another protein is a protein that localizes in a cell.

30. The fusion fluorescent protein according to claim 28 or 29, wherein another protein is a protein specific to a cell organella.

31. A fusion protein, which consists of the chromoprotein according to claim 5 or 11 and another protein.

32. A method for analyzing the localization or dynamics of a protein in a cell, which is characterized in that the fusion fluorescent protein according to any one of claim 28 to 30 is allowed to express in the cell.

33. A method for analyzing physiologically active substances, which is characterized in that the FRET (fluorescence resonance energy transfer) method is carried out using the chromoprotein according to claim 5 or 11 as an acceptor protein.

34. A fluorescent reagent kit, which comprises: the fluorescent protein of any one of claims 1 to 4, 6, 7 to 10, and 12; the DNA of any one of claims 14 to 21, 24, and 25; the recombinant vector of claim 26; the transformant of claim 27; or the fusion fluorescent protein of any of claims 28 to 30.

35. An absorbance reagent kit, which comprises: the chromoprotein of claim 5 or 11; the DNA of claim 22 or 23; the recombinant vector of claim 26; the transformant of claim 27; or the fusion protein of claim 31.